I-17 CORRIDOR PROFILE STUDY

SR 101L TO I-40

ADOT Work Task No. MPD 072B-14

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Draft Working Paper 3: Corridor Vision

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PREPARED FOR:

Arizona Department of Transportation

PREPARED BY:

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1 INTRODUCTION

The Arizona Department of Transportation (ADOT) is the lead agency for this corridor profile study of Interstate 17 (I-17) between SR 101L in Phoenix and I-40 in Flagstaff. This study will look at key performance measures relative to the I-17 corridor, and use those as a means to prioritize future improvements in areas that show critical deficiencies. The intent of the corridor profile program, and of the Planning to Programming process, is to conduct performance-based planning to identify areas of need and make the most efficient use of available funding to provide an efficient transportation network.

1.1 Corridor Overview

The Arizona Sun Corridor is one of eleven megapolitan areas in the United States, defined as a conglomeration of two or more intertwined metropolitan areas. The Sun Corridor megapolitan extends from Nogales to Prescott, and is similar to Indiana in area and population. The Sun Corridor is one of the fastest growing areas in the country, with I-17 playing a key role in the transportation infrastructure of its northern portion, contributing to its economic success.

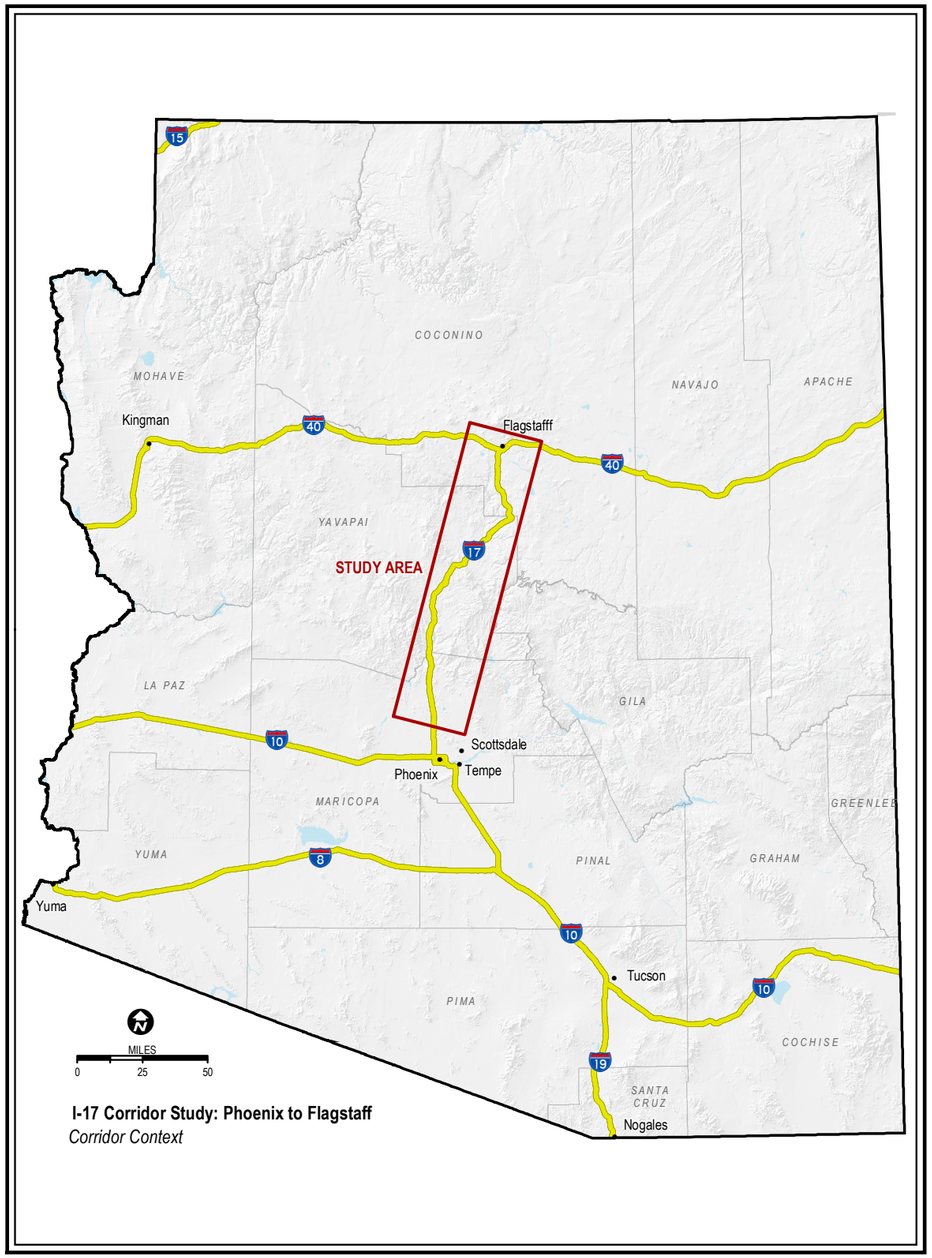
I-17 provides the most direct and fastest link between Phoenix (and I-10) and Flagstaff (and I-40) (Figure 1). I-17 provides a principal road link for national and international traffic from Phoenix Sky Harbor International Airport to Prescott, the Verde Valley, Sedona, Flagstaff, the Grand Canyon, and the Navajo and Hopi nations (Figure 2). This study builds on earlier planning efforts in developing and applying a performance-based process for prioritizing improvements to meet present and future needs in the corridor.

1.2 Corridor Study Purpose

ADOT seeks to identify a new corridor planning approach to develop strategies and tools that incorporate life-cycle cost analysis and risk assessment to measure system performance. This Corridor Profile Study, along with similar studies of I-19 and I-40, will develop a new process to:

- Inventory past improvement recommendations.
- Assess the existing performance based on quantifiable performance measures.
- Propose various solution sets to improve corridor performance.
- Identify specific projects that can provide quantifiable benefits in relation to the performance measures.
- Prioritize the projects for future implementation

Figure 1: Study Location Map



1.3 Corridor Study Objective

The objective of this study is to identify a recommended set of prioritized potential projects for consideration in future construction programs, derived from a transparent, defensible, logical, and replicable process.

1.4 Working Paper Objectives

The objective of Working Paper # 3 is to establish the existing national, regional, and local context of the I-17 corridor, summarize the results of the corridor performance, and develop a vision and goals for the future of this corridor.

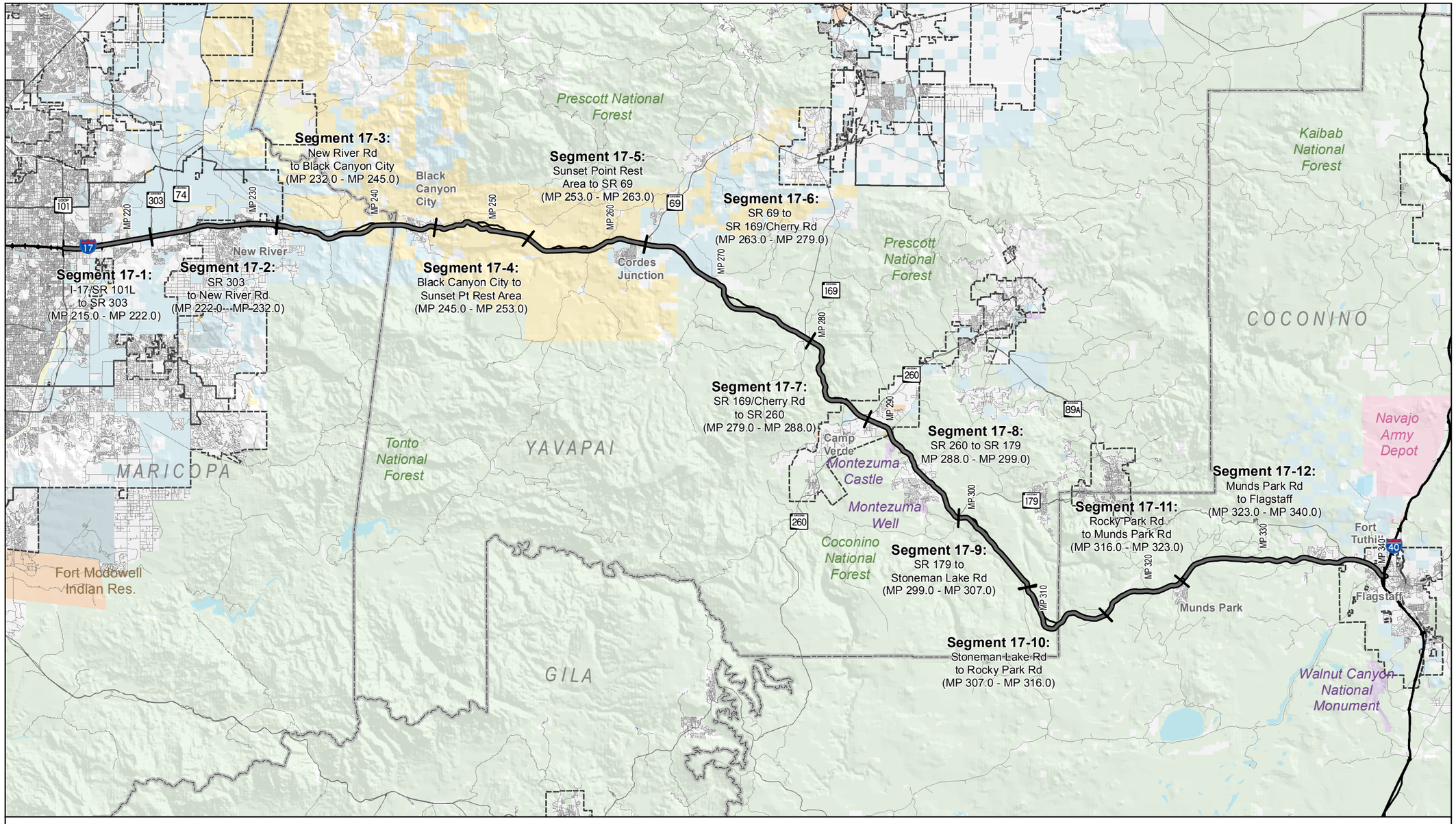
1.5 Study Location and Corridor Segments

The I-17 Corridor is 125 miles long, from SR 101L (Milepost [MP] 215.0) to I-40 (MP 340.0). The corridor has been divided into twelve distinct segments based on regionally significant intersecting routes, changes in topography, or natural or man-made landmarks along the corridor. The shortest segment is seven miles long and the longest, seventeen miles. Corridor Segments have been described in Table 1 below, and shown on a map in Figure 2.

Table 1: Corridor Segmentation

Segment #	Segment Description	Character Description
Segment 1	SR101L to SR 303L (MP 215.0 to MP 222.0)	Segment 1 is generally urban/fringe-urban in nature while Segment 2 is generally rural in nature. Both are within the urbanized limits of the Phoenix Metropolitan Area in Maricopa County. Segment 1 includes six interchanges and Segment 2 includes six interchanges.
Segment 2	SR 303L to New River Road (MP 222.0 to MP 232.0)	
Segment 3	New River Road to Black Canyon City (MP 232.0 to MP 245.0)	Segment 3 is generally rural in nature, includes three interchanges, and spans both Maricopa and Yavapai Counties
Segment 4	Black Canyon City to Sunset Point Rest Area (MP 245.0 to MP 253.0)	Segment 4 is rural in nature, includes significant changes in topography, two interchanges, and is within Yavapai County.
Segment 5	Sunset Point Rest Area to SR 69 (MP 253.0 to MP 263.0)	Segment 5 is rural in nature, includes changes in topography, three interchanges, and is located within Yavapai County.
Segment 6	SR 69 to SR 169 (MP 263.0 to MP 279.0)	Segment 6 is rural in nature, passes through generally rolling terrain, includes two interchanges, and is located within Yavapai County.
Segment 7	SR 169 to SR 260 (MP 279.0 to MP 288.0)	Segment 7 goes through significant topography and elevation changes, is rural in nature, includes two interchanges, and is within Yavapai County.
Segment 8	SR 260 to SR 179 (MP 288.0 to MP 299.0)	Segment 8 passes through gradual elevation changes, is rural in character, includes three interchanges, and is located within Yavapai County.
Segment 9	SR 179 to Stoneman Lake Road (MP 299.0 to MP 307.0)	Segment 9 is rural in nature, includes changes in topography, one interchange, and is located within Yavapai County.
Segment 10	Stoneman Lake Road to Rocky Park Road (MP 307.0 to MP 316.0)	Segment 10 is rural in nature, includes changes in topography, one interchange, and spans both Yavapai and Coconino Counties.
Segment 11	Rocky Park Road to Munds Park Road (MP 316.0 to MP 323.0)	Segment 11 is rural in nature, includes three interchanges, and is located within Coconino County.
Segment 12	Munds Park Road to I-40 (MP 323.0 to MP 340.0)	Segment 12 transitions from a rural setting to a fringe-urban setting, includes four interchanges, is located within Coconino County, and extends into the City of Flagstaff.

Figure 2: Project Vicinity/Segmentation Map



2 CORRIDOR OVERVIEW

Arizona is connected with the rest of the country through two major east-west transcontinental interstate corridors, namely I-10 and I-40. I-10 connects Southern Arizona to California (Los Angeles) on the west coast and Florida (Jacksonville) on the east coast. I-40 connects Northern Arizona to California (Los Angeles) on the west coast and North Carolina (Wilmington) on the east coast. I-17 serves as the only major north-south transportation corridor link that connects Phoenix Metropolitan Area with northern Arizona and provides a connection between I-10 and I-40.

2.1 General Function

I-17 plays a vital role in the Arizona Sun Corridor and is the only surface route directly connecting the Phoenix metropolitan area with Flagstaff, the largest city in northern Arizona and its economic and cultural hub. It is also the shortest passenger and freight link between Arizona's two principal east-west transcontinental highways, I-10 and I-40. The portion of I-17 studied in this corridor profile study extends 125 miles from SR 101L (MP 215.0) in Phoenix to I-40 in Flagstaff (MP 340.0), where the freeway terminates and becomes an urban street, Milton Road.

I-17 also connects with major freeways in the Phoenix Metropolitan Area, including SR 101L connecting the east and west valleys, SR 303L through the west valley, SR 74 connecting with US 60, SR 69 and SR 169 connecting to the Prescott region, SR 260 connecting to Cottonwood and Clarkdale, and SR 179 connecting with Sedona. I-17 also links Phoenix and Flagstaff with the communities of New River and Camp Verde.

In terms of existing traffic volumes, I-17 witnesses the highest volumes of traffic in Segments 1 and 2. Segments 3, 4, and 5 see significantly lower traffic volumes, fluctuating between 25,000 to 35,000 vehicles per day. Segments 6 through 12 witness, on average, less than 25,000 vehicles per day. Table 2 provides the Average Annual Daily Traffic (AADT) volumes for the I-17 corridor segments.

Based on traffic volume data provided by ADOT, Segment 1 currently experiences a slight decrease in daily traffic volumes on the weekend and a slight increase (10%-15%) in daily traffic volumes on Friday when compared to mid-week. This is likely due to the urban character at the southern end of the corridor with a high volume of commuter traffic during the week.

Segment 2 currently experiences a 5%-15% increase in daily traffic volumes on the weekend and a 20%-25% increase in daily traffic volumes on Friday when compared to mid-week.

The middle and northern end (Segments 6, 7, 8, and 11) of the corridor currently experience a 30%-35% increase in daily traffic volumes on Friday and on the weekend when compared to mid-week.

I-17 provides many important functions including, a commuter route between northern Maricopa County and Phoenix, a recreational route between Phoenix and northern Arizona, and a commercial route connecting I-10 and I-40.

Table 2: 2013 Traffic Volumes along I-17

Segment	2013 Traffic Volume (VPD)
1	102,200
2	60,400
3	33,200
4	28,300
5	27,800
6	19,800
7	25,100
8	21,200
9	17,900
10	14,600
11	14,800
12	17,300

Source: ADOT HPMS Data

2.2 Regional Connectivity

I-17 provides the principal road link from Phoenix Sky Harbor International Airport to metropolitan Prescott, the Verde Valley (Camp Verde, Clarkdale, Cottonwood, Yavapai-Apache Nation), Sedona, metropolitan Flagstaff, Grand Canyon National Park, and the Navajo and Hopi Reservations. Roughly midway between Phoenix and Flagstaff, I-17 runs through the town of Camp Verde for approximately five miles in the Verde Valley.

In combination with SR 89 north of Flagstaff, I-17 is one of the two main corridors (along with the US 93/I-15 combination through Las Vegas) for traffic from central Arizona to Utah and beyond. Although several sections of I-17 pass through unusually steep terrain for an Interstate highway, it carries high volumes of freight traffic that enter and/or leave the state on I-10 and I-40. As already mentioned, I-17 is the critical north-west transportation corridor that connects I-10 and I-40, the two major east-west corridors that connect Arizona with the rest of the country.

I-17 connects to SR 101L and SR 303L on the north end of the Phoenix Metropolitan Area. SR 101L, a principal freeway, forms an outer loop around the northern part of Phoenix connecting I-17

to I-10 and SR 202L. SR 303L, a principal freeway, forms an outer loop around the western part of Phoenix connecting I-17 to I-10. I-17 provides connectivity to the region through regionally significant state routes such as SR 69, SR 74, SR 89A, SR 169, SR 179, and SR 260. SR 69 and SR 169 connect I-17 to Prescott, Prescott Valley, Dewey-Humboldt and Chino Valley; SR 260 to Cottonwood, Clarkdale, Jerome, and Verde Village (as well as Payson to the east); and SR 179 and SR 89A to Sedona and the Village of Oak Creek. Farther south, in Maricopa County, SR 74 serves as a major route to Lake Pleasant Recreation Area and west to Wickenburg.

The transportation facilities discussed above have various functional classifications. I-17 and I-40 have been assigned the highest roadway functional classification: Principal Interstate. In the Phoenix area, SR 101L and SR 303L are Principal Freeways. SR 69, SR 260 west of I-17, and SR 179 are classified as Principal Other. Of the remaining intersecting state highways, SR 260 to the east (Camp Verde) and SR 169 are minor arterials, while SR 74 is a major collector. Figure 3 shows the major corridors which contribute to providing the regional connectivity along I-17.

2.3 Commuter Traffic

I-17 is used by daily commuters between suburban and rural communities and Phoenix and Flagstaff metropolitan areas. I-17 provides access to Phoenix for commuters from Anthem and New River, going as far north as Prescott, Prescott Valley, Dewey-Humboldt, and Camp Verde. I-17 is also a commuter route between Flagstaff and Sedona, Camp Verde, Cottonwood, Clarkdale, and the Prescott Valley area.

2.4 Recreational Traffic

Arizona offers a variety of recreational opportunities for its citizens as well as the millions of visitors that travel to the state in search of warmer weather and outdoor adventure and exploration opportunities. Arizona's warm weather and natural beauty makes tourism one of the state's top industries. According to the Arizona Office of Tourism, in 2013, 33.8 million people visited Arizona who collectively spent $19.8 billion in the state, which supports jobs and generates tax revenue.

I-17 is the main transportation corridor that connects Phoenix Metropolitan Area and Sky Harbor International Airport with some of the biggest tourism and recreational attractions that Arizona has to offer including the Grand Canyon National Park, Sedona, Oak Creek, Slide Rock State Park, and Montezuma Castle National Monument. According to publicly available statistics, Grand Canyon National Park had an annual visitation of 4.5 million visitors in 2013 and Sedona receives an average of 4 million visitors annually. Northern Arizona destinations are especially popular during the summer months due to the cooler temperatures compared to the rest of the state. The Snow Bowl in Flagstaff is a very popular destination during winter months.

2.5 Commercial/Truck Traffic

Arizona is primarily a pass-through state for freight traffic coming from the ports of Los Angeles and Long Beach and going east to the central U.S. for distribution. Some of the freight traffic destined for Arizona uses the I-17 corridor to reach the Phoenix area from I-40, and to reach northern Arizona from I-10. In 2005, approximately 557 million tons of freight valued at $2.3 billion moved to, from, within, or across Arizona. Roughly three-quarters of the freight (by weight) moved on the state's highway system by truck.

Land use forecasts show a pattern of growth along a linear corridor stretching from the eastern edge of Tucson northwest along I-10 to Phoenix and I-17 toward Prescott (and Flagstaff). This linear growth pattern will dictate the development of transportation networks and therefore the local and regional patterns for distributing goods. As communities north of Phoenix along I-17 continue to grow, the level of traffic along this north-south corridor will keep increasing.

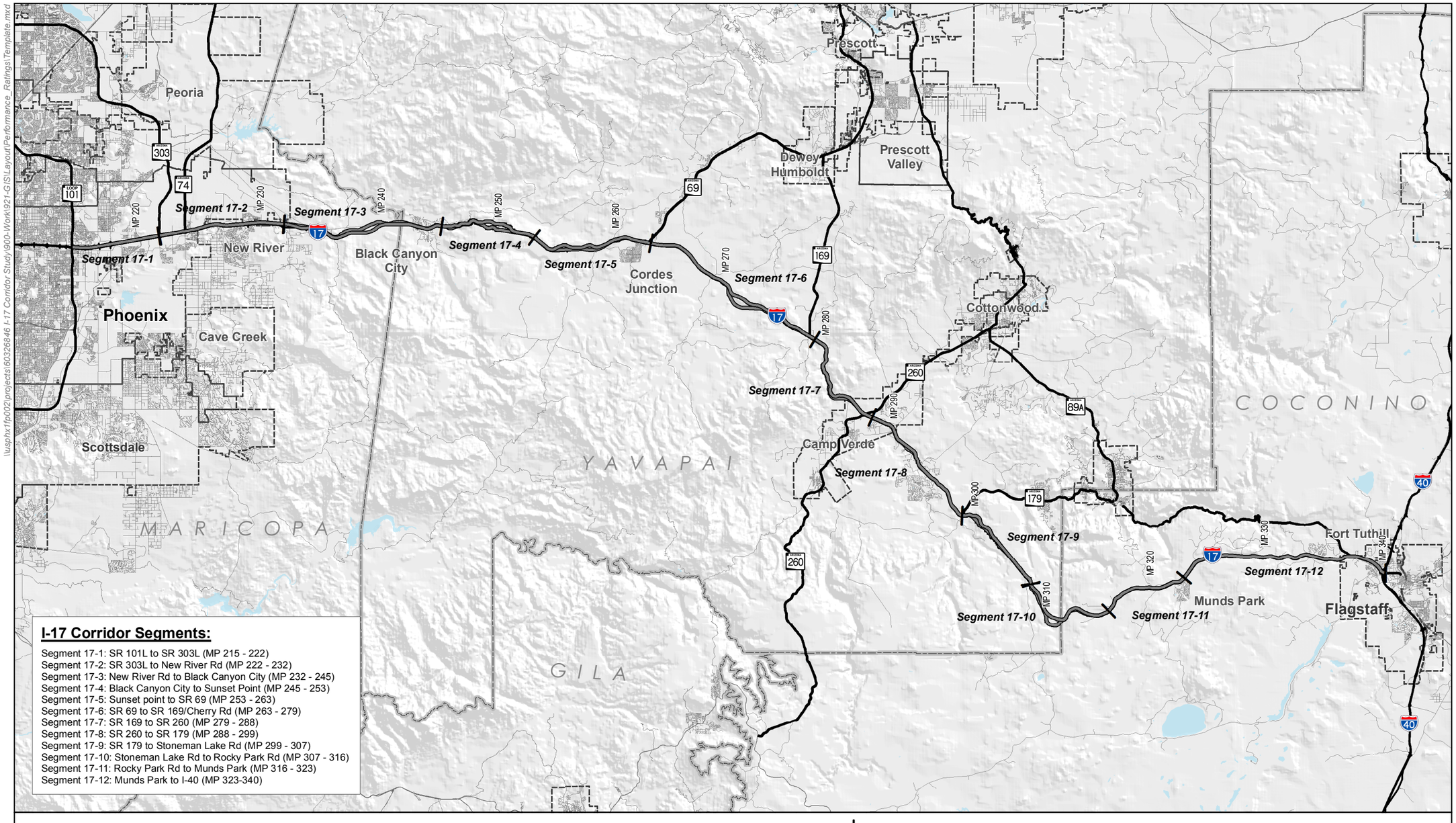
ADOT conducted an extensive stakeholder outreach program during the Arizona Multimodal Freight Analysis Study. One of the primary concerns raised by stakeholders was the increasing volume of through trucks traveling from southern California through Flagstaff and other northern Arizona communities. Federal safety regulations that restrict the time truck drivers can operate without a rest period force them to stop and park when they time out. As a result, an increasing number of trucks park along highways and in neighborhoods throughout communities in northern Arizona and elsewhere. I-17 has a limited number of rest areas and other truck stops with appropriate amenities.

According to the ADOT Multimodal Planning traffic database for 2013, trucks constituted approximately 12 percent of the total traffic along I-17.

ADOT has recently completed an effort to identify corridors throughout the state where improvements to the transportation infrastructure will support the greatest potential commercial and economic benefits. These "Key Commerce Corridors" represent a strategic statewide approach to leverage infrastructure improvements to enhance Arizona's competitive economic position. I-17 has been identified as a "Key Commerce Corridor" due to the critical role it plays in the movement of freight /commercial truck traffic in the state.

The U.S. Department of Transportation, under Section 167(c) of title 23 United States Code (U.S.C.), created by Section 1115 of the Moving Ahead for Progress in the 21st Century Act (MAP–21), is directed to establish a National Freight Network (NFN) to assist States in strategically directing resources toward improved system performance for efficient movement of freight on the highway portion of the Nation's freight transportation system. I-17 has been designated by ADOT as part of the National Primary Freight Network.

Figure 3: Regional Connectivity



2.6 Traveler Amenities

ADOT operates two rest areas along the corridor for both commercial and non-commercial vehicles. Sunset Point, which doubles as a scenic viewpoint, is located on the west side of I-17 between the Bumble Bee and Badger Springs Road interchanges. Approximately 45 miles north of Sunset Point, between the McGuireville and Sedona interchanges, the recently refurbished McGuireville rest areas exist on both sides of the highway. Both rest areas offer such amenities as restrooms, drinking fountains, vending machines, picnic tables, and pet exercise areas.

Private businesses provide fuel, food, lodging, and related services at several points along I-17 including the communities of Anthem, New River, Rock Springs/Black Canyon City, Cordes Junction, Camp Verde, McGuireville/Lake Montezuma, and Munds Park.

2.7 Multimodal Uses

Transit and Rail Services

The largest metropolitan transit system in Arizona is located in the Phoenix metropolitan area, where Valley Metro and member cities operate a regional system of buses, light rail, and paratransit (demand-responsive service). Bus routes in the I-17 corridor currently extend as far north as Happy Valley Road. At the other end of the corridor, Flagstaff's metropolitan transit system, known as Mountain Line, operates eight bus routes, with paratransit (Mountain Lift) for those unable to use the bus system. Service operates seven days a week throughout Flagstaff.

Many private, not-for-profit agencies throughout the state offer transportation to the elderly, persons with disabilities, and others with special needs. The FTA Section 5310 program offers grants through ADOT to purchase vehicles for this type of service. In the I-17 corridor, the ADOT 2014 Map Book shows that Section 5310 vehicles serve Phoenix, New River, Black Canyon City, Camp Verde, the Yavapai-Apache Nation, and Flagstaff.

Greyhound Lines, the principal provider of scheduled intercity bus service in the U.S., has several daily trips between Phoenix and Flagstaff that utilize I-17, linking the carrier's cross-country routes on I-10 and I-40. The National Railroad Passenger Corporation (Amtrak) operates its daily Southwest Chief on the BNSF Railway between Chicago and Los Angeles, with a stop in Flagstaff. Amtrak offers connecting bus service between this station and Phoenix, which utilizes I-17. No direct rail freight or passenger service links Phoenix with Flagstaff.

Air Transportation

Flagstaff Pulliam Airport, located just east of I-17 and about three miles south of Flagstaff, is primarily a general aviation facility, but US Airways provides daily commercial air service to and from Phoenix Sky Harbor International Airport. Connections are available in Phoenix to destinations throughout the nation and abroad.

Non-Motorized Transportation

Bicycles are prohibited on I-17 south of SR 74 (Carefree Highway interchange). From SR 74 to Flagstaff, bicyclists are permitted to use the shoulders only. Pedestrians are prohibited on the entire route.

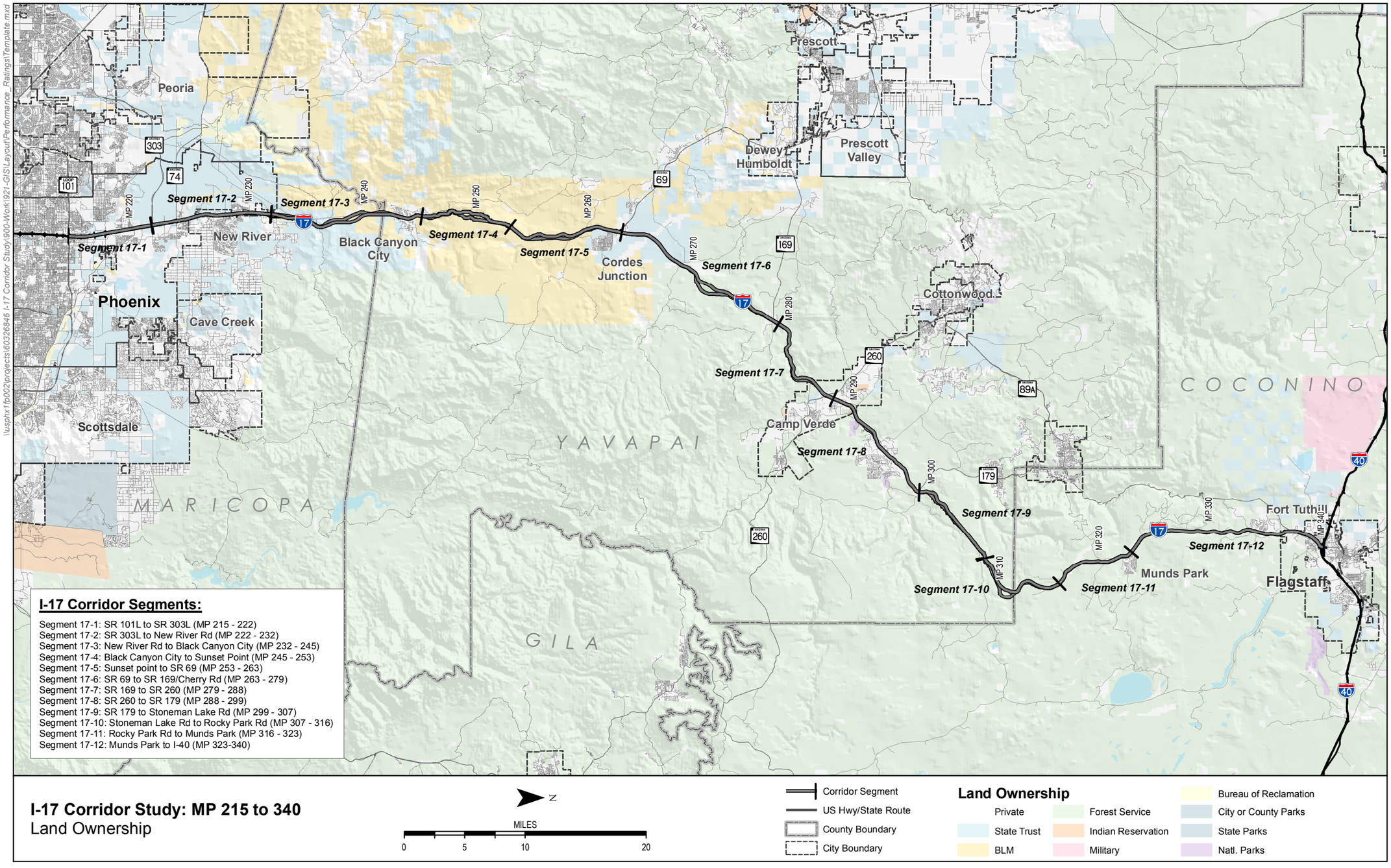
2.8 Land Ownership, Land Use and Jurisdiction

Land ownership and management in Arizona are dominated by public land: State Trust (Arizona State Land Department), federal Bureau of Land Management (BLM), U.S. Forest Service, and other federal agencies such as the National Park Service and Bureau of Reclamation. There are also 22 sovereign Indian tribes or nations responsible for 27 percent of Arizona land. Only about one-quarter of the land along the I-17 corridor is privately owned. It is scattered along the corridor, but concentrated in its southern half. About 45% of the total land lies within the Coconino and Prescott National Forests, located in the northern half of the corridor (north of Cordes Junction).The BLM and Arizona State Land Department are the other major landholders. Tribal land and National Parks account for less than 1% each of the total land ownership. Table 3 and Figure 4 show the land ownership along the I-17 study corridor.

Table 3: Land Ownership

Land Ownership	% of Total Study Corridor Length
Private	25%
Arizona State Land Department	15%
BLM	15%
U.S. Forest Service	45%
National Park Service	<1%
Yavapai-Apache Nation	<1%

Figure 4: Land Ownership



Jurisdictions

The Phoenix metropolitan area, spanning a total of 14,565 square miles, is the largest metropolitan area in Arizona and has a population of 4.2 Million people (2010 Census). The metropolitan area falls within two counties, Maricopa and Pinal. Phoenix Metropolitan area is located at the southern end of the I-17 corridor.

Flagstaff, located at the northern end of the I-17 corridor, is a city of approximately 66,000 people and is spread over an area of 63.9 square miles. Phoenix and Flagstaff are the two largest urban population centers along the I-17 corridor. Various Census Designated Places (CDP) are located along the corridor. Census Designated Places are defined as those places which had a population greater than 500 at the time of the 2010 census. These include Anthem, New River, Black Canyon City, Camp Verde, and Munds Park.

Various mid-sized cities and towns are located in the Central Yavapai County region, including the communities of Prescott, Prescott Valley, Sedona, Cottonwood, Clarkdale, Chino Valley, and Dewey Humboldt.

These communities are expected to witness significant growth in the next few decades that will put more pressure on the existing transportation infrastructure along the I-17 corridor. Table 4 below shows the existing and the projected future 2040 population of the jurisdictions along the study corridor.

Table 4: Existing and Future Population

Jurisdiction	2010 Population	2014 Population	Projected 2040 Population
Phoenix	1,445,632	1,495,900	2,116,900
Flagstaff	65,870	68,140	87,735
Prescott	39,843	40,296	46,341
Prescott Valley	38,822	40,309	62,653
Anthem CDP	21,700		
New River CDP	14,952		
Cottonwood	11,265	11,463	15,633
Camp Verde	10,873	11,037	14,497
Chino Valley	10,817	11,115	17,405
Sedona	10,031	10,189	12,892
Village of Oak Creek CDP	6,147	6,328	8,226
Clarkdale	4,097	4,176	5,848
Dewey Humboldt	3,894	3,960	5,357
Black Canyon City CDP	2,837		
Munds Park CDP	631	629	671

Source: U.S. Census, Arizona Department of Administration – Employment and Population Statistics

Figure 5 and Figure 6 show the 2010 population and 2040 projected population densities along the study corridor, while Figure 7 and Figure 8 represent the 2010 employment and 2040 projected employment densities. This data is taken from the ADOT Travel Demand Model.

Land Use

The City of Phoenix is currently completing its new General Plan, known as 'PlanPHX.' A public comment draft of the general plan is now available (early 2015). Maricopa Association of Governments (MAG) projects the population of Phoenix to grow from 1.45 million in 2010 to about 1.95 million in 2030. The General Plan Land Use map for the area near I-17 is shown in Figure 9 .

I-17 bisects the town of Camp Verde, which extends up to eight miles from the highway to the northwest and ten miles to the southeast. The incorporated boundary of Camp Verde contains approximately 43.2 square miles, of which the U.S. Forest Service administers approximately 41%. The State Land Department is the other large land owner in the town limits. The town envisions a future in which it will maintain its largely rural character. Figure 10 shows the land use map from the Camp Verde 2004 General Plan.

Fort Verde State Historic Park is located in central Camp Verde and Montezuma Castle National Monument is accessed from I-17 at the Middle Verde Road interchange. SR 260 to the west connects I-17 with numerous other attractions, such as the old mining town of Jerome, Deadwood Ranch State Park, Tuzigoot National Monument, the Verde Canyon Railroad, and Out of Africa Wildlife Park.

The lands of the Yavapai-Apache are surrounded by Camp Verde. Most of the nation's land is located north and west of I-17, but a small parcel on the east side contains the Cliff Castle Lodge and Casino, a major attraction and source of revenue, opened in 1995 and served by the Middle Verde Road interchange. The Camp Verde portions of the nation cover 576 acres, with the remainder dispersed elsewhere in the Verde Valley. The Yavapai and Apache are two distinct peoples, with the total Yavapai-Apache population estimated at up to 1,200.

Figure 5: 2010 Population Densities

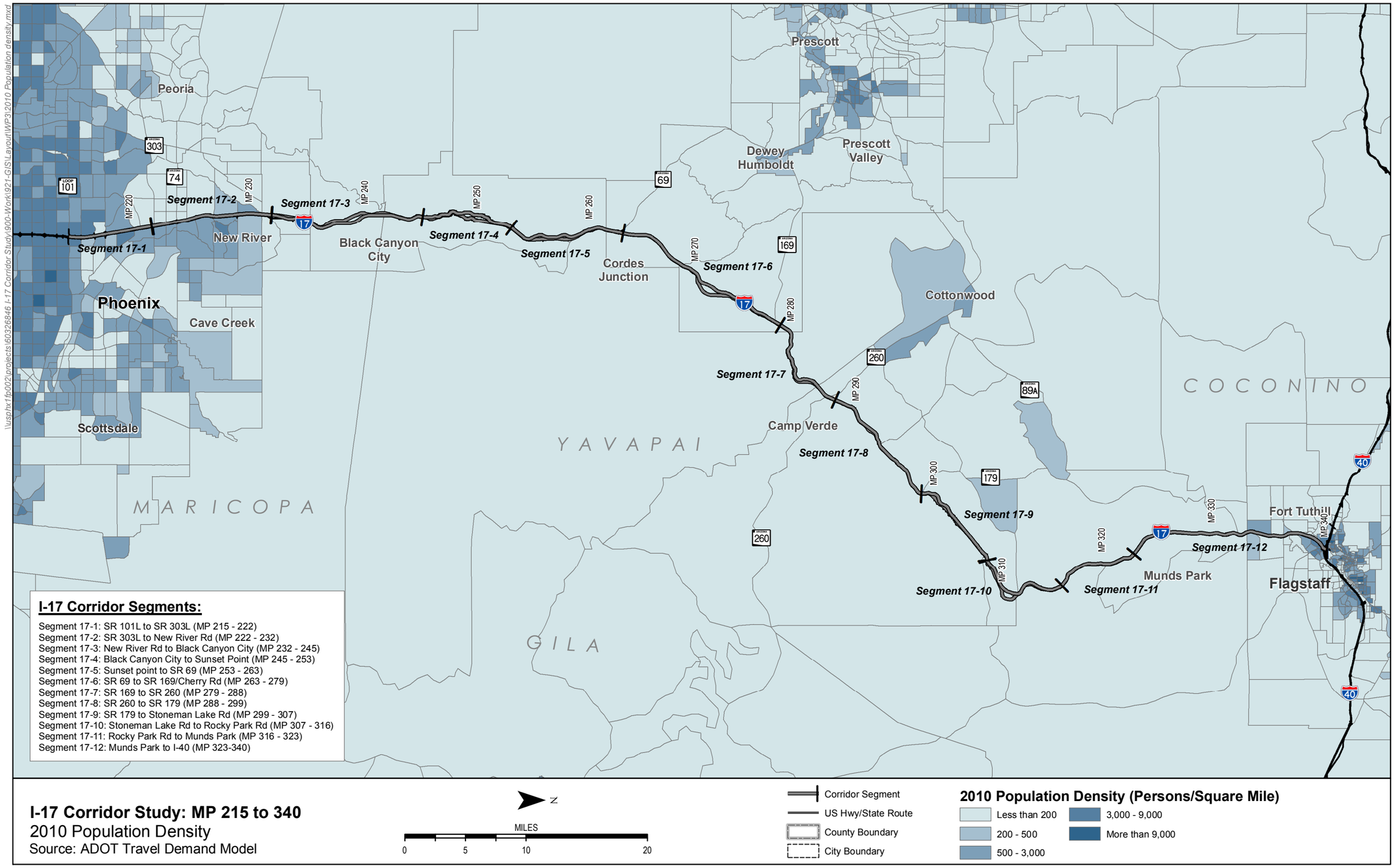


Figure 6: 2040 Population Densities

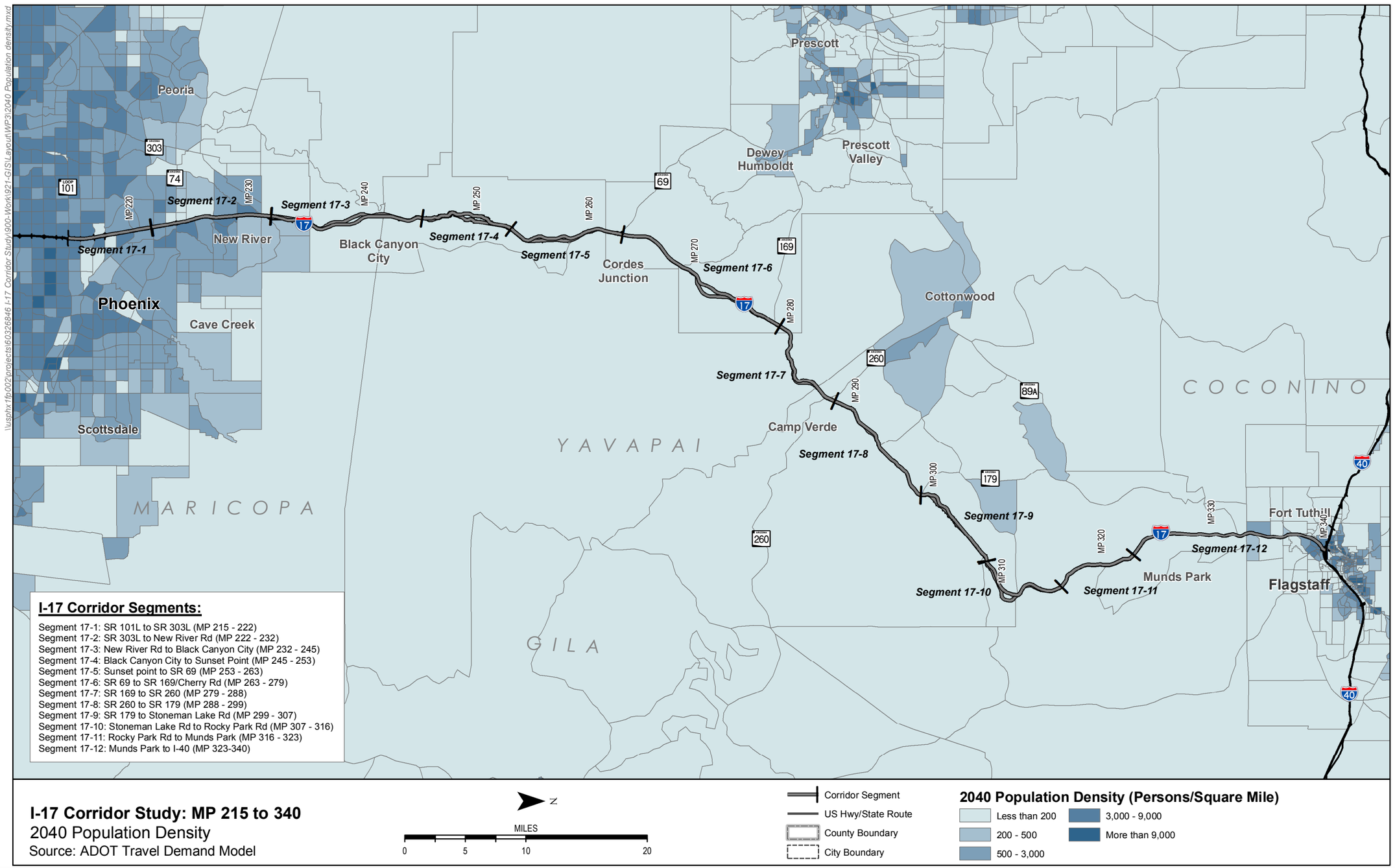


Figure 7: 2010 Employment Densities

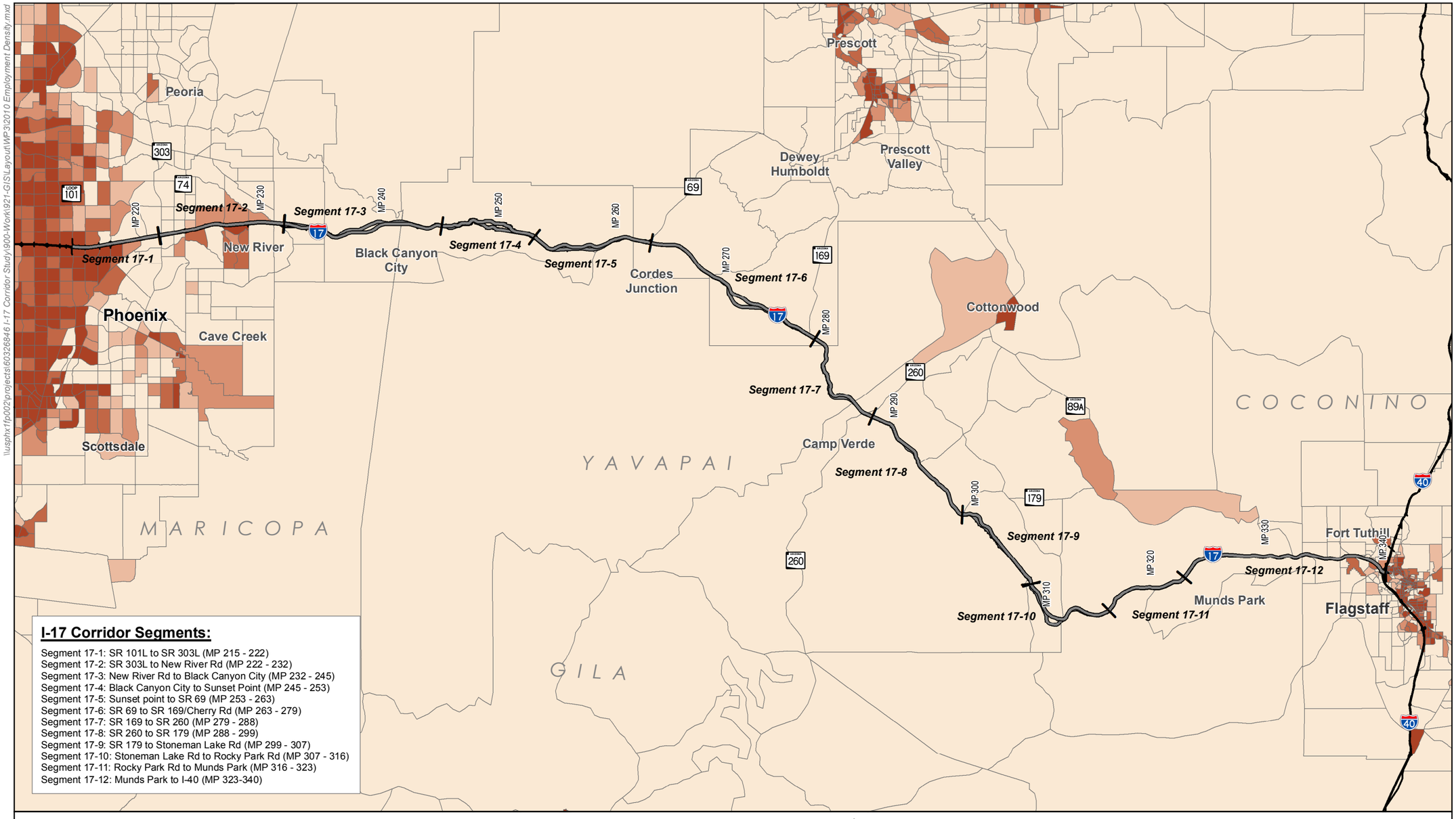


Figure 8: 2040 Employment Densities

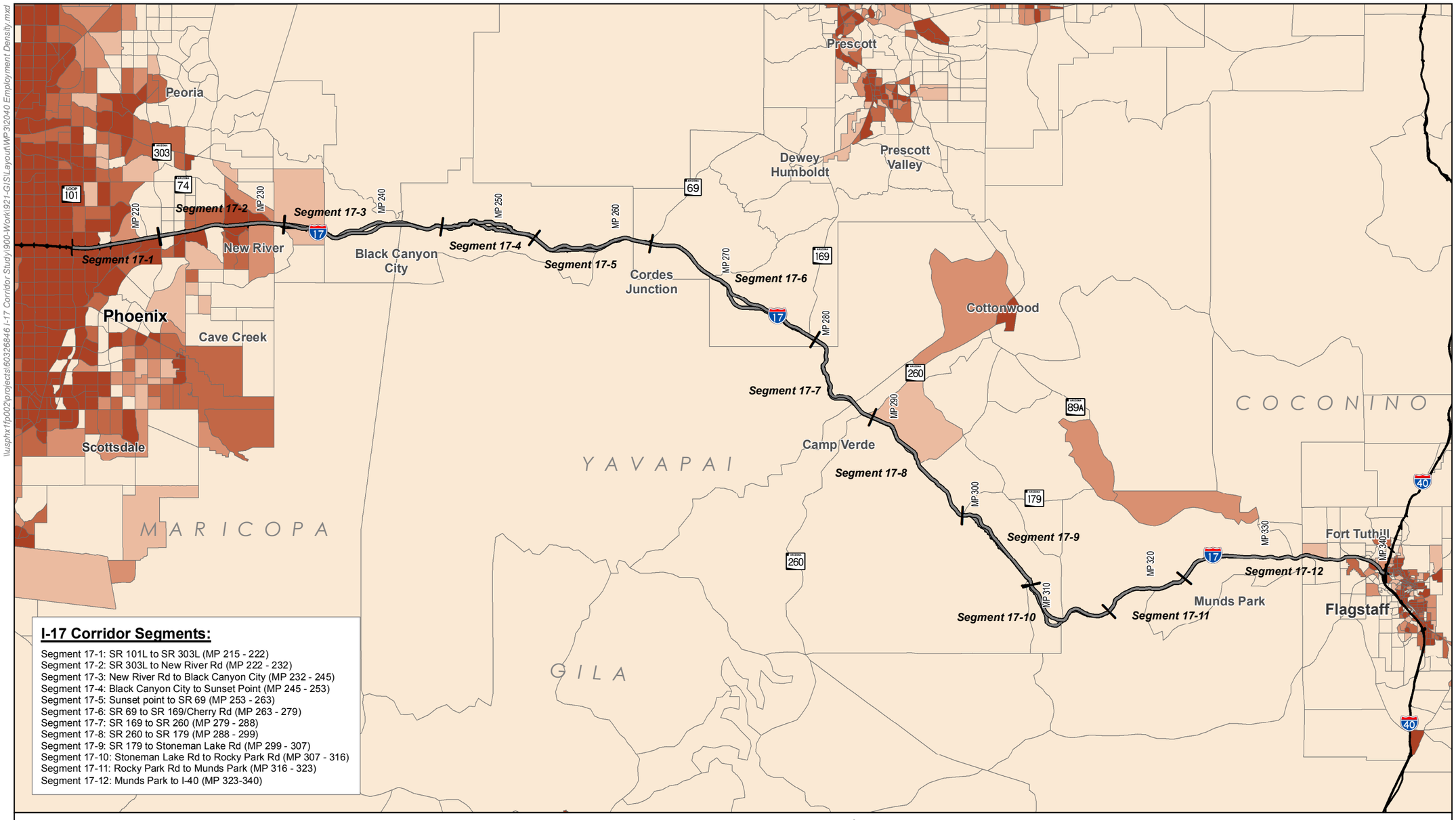


Figure 9: City of Phoenix General Plan – Land Use Map

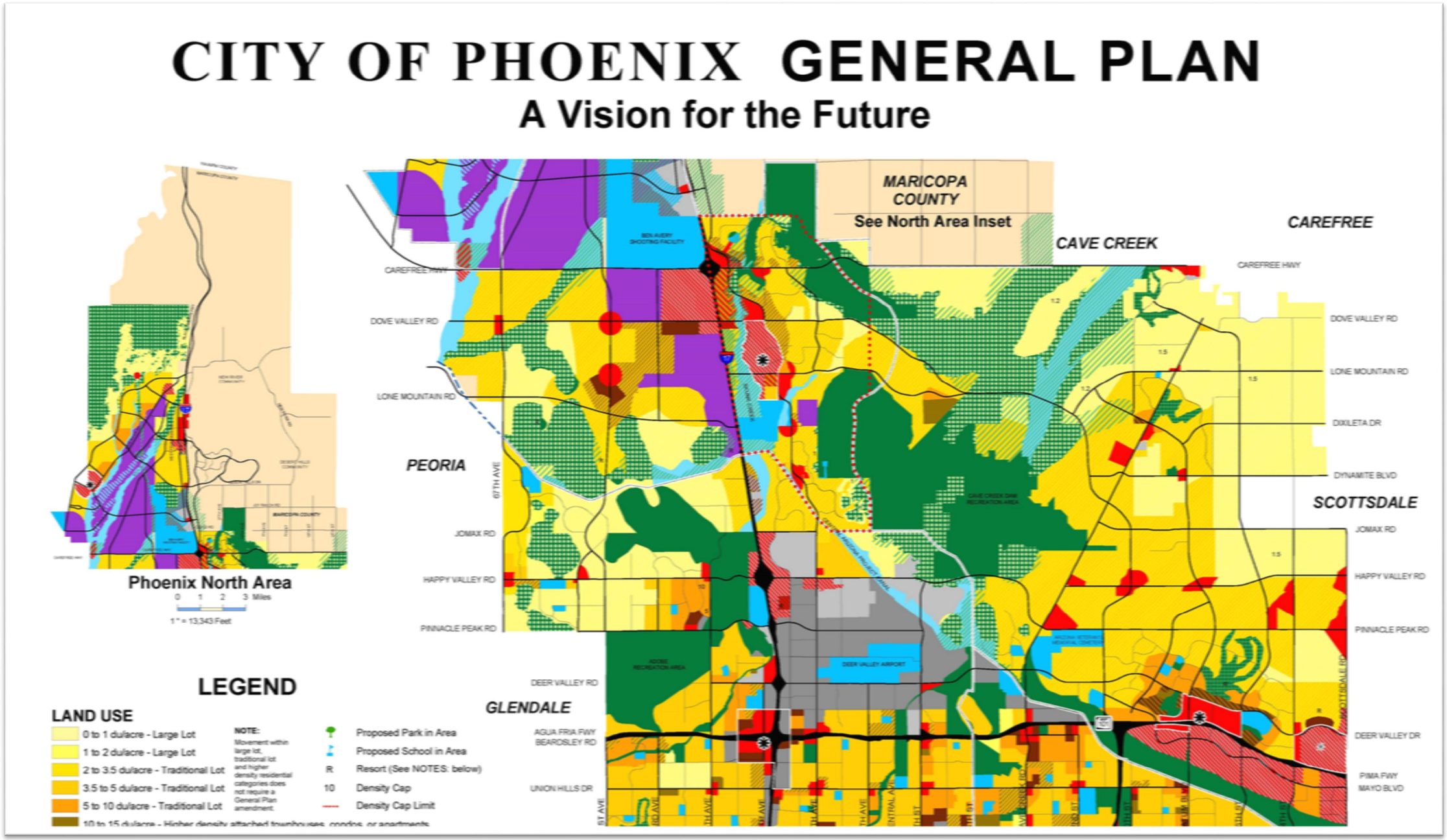
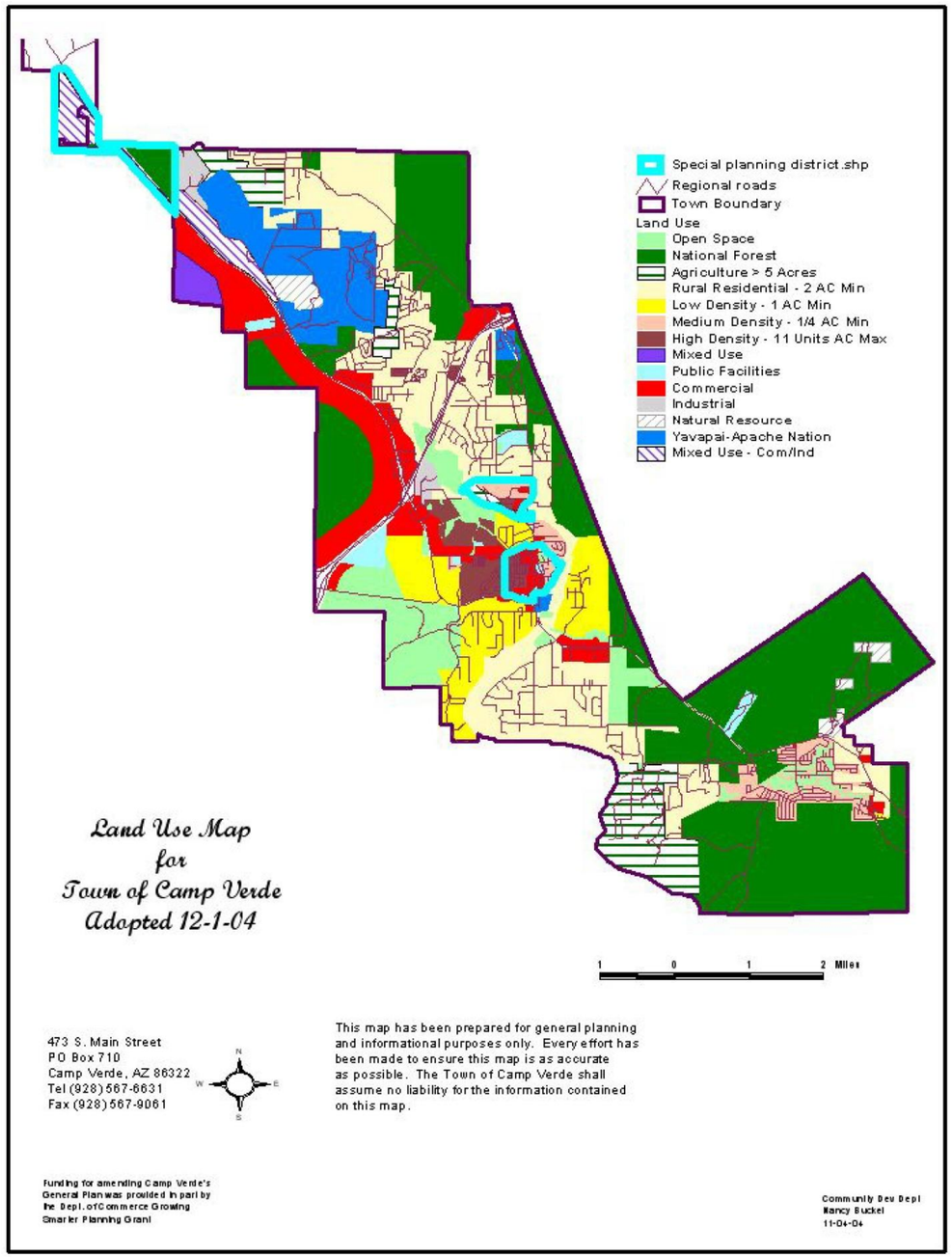


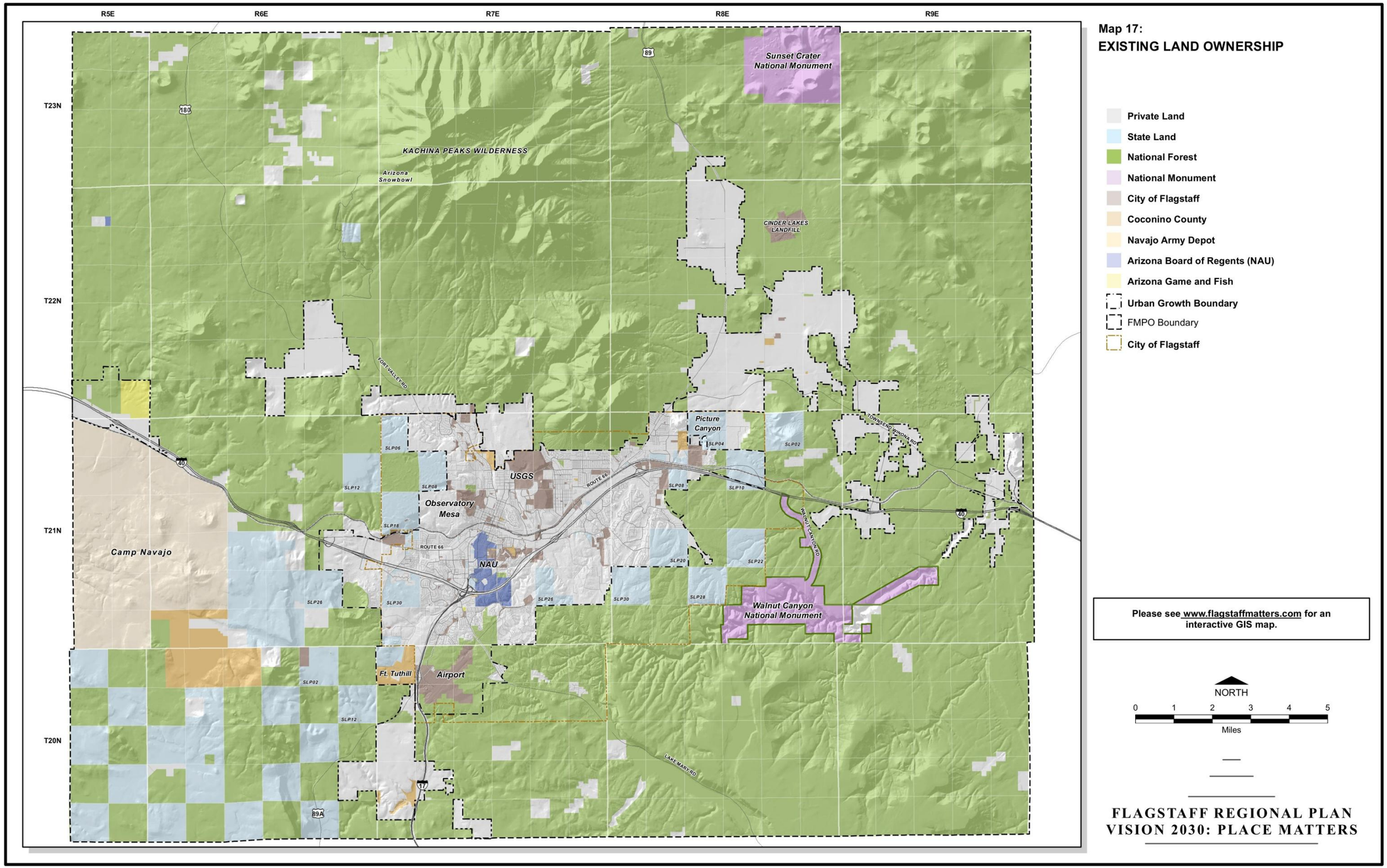
Figure 10: Town of Camp Verde Land Use Map



Flagstaff is the largest city in northern Arizona, located at the north end of the I-17 corridor. It encompasses just over 64 square miles nestled at the base of the San Francisco Peaks. The annual growth rate for the Flagstaff region has fluctuated between 2.2 percent in the 1990s and early 2000s, to about 1.1 percent in the late 2000s. The area's population is expected to grow to 92,500 by 2020 and to nearly 103,000 by 2030. The development density is expected to increase over the next 40 years, owing to the focus on growing within the existing urbanized area to protect surrounding open spaces.

In the 2030 Regional Plan, Flagstaff outlined its desire to be a more compact city with suitable housing, employment, and multimodal transportation options. Less than 14 percent of the land area covered by the plan is private. Approximately eight percent, or 42 square miles, is controlled by the Arizona State Land Department. Of this State Trust Land, 40 percent has been identified as suitable for development, with the remainder earmarked for conservation and open space. The majority of other undeveloped public land is managed by the U.S. Forest Service. As Figure 11 shows, Flagstaff is nearly surrounded by national forest land. Nearby National Park Service units consist of three national monuments: Walnut Canyon to the southeast, Sunset Crater to the northeast, and Wupatki immediately north of Sunset Crater.

Figure 11: Flagstaff Land Ownership



2.9 Conclusion

The Interstate 17 corridor is the only major transportation corridor that connects northern Arizona and the Phoenix Metropolitan Area, and provides a connection between I-10 and I-40. It serves commuter as well as recreational traffic, and has been identified in various studies and plans as integral to the national and state transportation network.

Although a variety of public transportation options either exist, or are planned throughout this region, the I-17 corridor continues to be the main transportation corridor for passenger and freight trips. With considerable growth expected to take place in the next two decades, travel demand will continue to strain the infrastructure along this corridor.

2.10 Stakeholder Input

Key stakeholders for this study include the Maricopa Association of Governments (MAG), Central Yavapai Metropolitan Planning Organization (CYMPO), Flagstaff Metropolitan Planning Organization (FMPO), Northern Arizona Council of Governments (NACOG), ADOT Phoenix District, ADOT Prescott District, ADOT Flagstaff District, and other ADOT departments. The stakeholders provided input on the corridor performance, performance data, issues, and Corridor Vision. Meetings were conducted with the key stakeholders between November 2014 and January 2015 to discuss the corridor performance and vision. The following input was received:

Phoenix District and MAG

- Scoping is underway for projects at the Pinnacle Peak and Happy Valley TI's
- Performance priorities are the Mobility and Safety Performance Areas

Prescott District and CYMPO

- Segment 4 is a high crash location
- Segment 4 is a high priority to alleviate congestion and enhance safety
- An on-going study is investigating potential improvements in Segment 4
- The corridor experiences a dramatic increase in traffic volumes on weekends and holidays
- Closures create significant issues as there is not a viable detour route
- The corridor is used for commuting between Verde Valley and Sedona, and Verde Valley and Prescott Valley
- Performance priorities are the Mobility and Safety Performance Areas

Flagstaff District and FMPO

- Pavement issues were identified on segments 9, 11, and 12
- High crash locations were identified on segments 10, 11, and 12
- The corridor experiences a dramatic increase in traffic volumes on weekends and holidays
- Closures create significant issues as there is not a viable detour route
- The corridor is used for commuting between Verde Valley and Flagstaff
- The corridor is used for business travelers to travel between Sky Harbor Airport and Flagstaff; some companies have buses that use this route to shuttle visitors or employees
- Performance priorities are the Safety, Pavement, and Bridge Performance Areas

3 SUMMARY OF CORRIDOR PERFORMANCE

A system to define baseline corridor performance was developed through a collaborative process involving ADOT and the consultant teams for the I-17, I-19, and I-40 Corridor Profile Studies. Baseline performance was evaluated using primary and secondary performance measures to define the health of the corridor and identify locations that warrant further diagnostic investigation to define needs and deficiencies. Needs and deficiencies are defined as the difference in baseline corridor performance compared to performance objectives.

The performance measures include five primary measures: Pavement Index, Bridge Index, Mobility Index, Safety Index, and Freight Index. Additionally, a set of secondary performance measures were identified for a more detailed analysis of corridor performance. Table 5 provides the complete list of primary and secondary performance measures for each of the five performance areas.

Table 5: Corridor Performance Measures

Performance Area	Primary Measure	Secondary Measures
Pavement	Pavement Index (based on a combination of International Roughness Index and Cracking)	• Pavement Serviceability • Pavement Failure • Pavement Hot Spots
Bridge	Bridge Index (based on Deck Rating, Substructure Rating, or Superstructure Rating)	• Sufficiency Rating • Functionally Obsolete • Bridge Hot Spots
Mobility	Mobility Index (based on combination of Current V/C and Future V/C)	• Current Volume/Capacity • Future Volume/Capacity • Travel Time Index (TTI) • Planning Time Index (PTI) • Road Closure Frequency • Multimodal Opportunities
Safety	Safety Index (based on frequency of fatal and incapacitating injury crashes)	• Frequency of Strategic Highway Safety Plan Emphasis Areas • Frequency of Truck Crashes • Frequency of Motorcycle Crashes • Safety Hot Spots
Freight	Freight Index (based on Truck Planning Time Index)	• Truck Travel Time Index (TTTI) • Truck Planning Time Index (TPTI) • Road Closure Duration • Clearance Restrictions

Each of the primary and secondary performance measures identified above is a quantifiable measure. In order to standardize the performance scale across the five performance areas, a three-level scale was used: Good, Fair, and Poor. Numerical thresholds were developed for each of the performance measures, to correspond to the three-level scale.

Good – Rating for performance is consistently above the identified average range

Fair – Rating for the performance falls within the identified average range

Poor – Rating for the performance is consistently below the identified average range

Corridor performance was evaluated by segment, and an overall corridor weighted average was calculated for the entire study corridor. Figure 12 on the next page shows the corridor and segment performance for each primary measure (Index). The weighted average ratings are summarized in Figure 13 which also provides a brief description of each performance measure. Figure 13 represents the average for the entire corridor and any given segment or location could have a higher or lower rating than the corridor average.

3.1 Bridge

The Bridge Index and secondary performance measures were calculated for the I-17 corridor using bridge condition data provided by ADOT for the timeframe from 2012 to 2014.

Overall, based on the weighted average of the Bridge Index, the bridges are in “fair” condition. Nearly all of the bridges are in “good” or “fair” condition. The only structurally deficient bridge on the corridor, the McGuireville TI Bridge, is located in segment 8. The McGuireville TI Bridge also has a bridge sufficiency rating of “poor”.

There are a high number of functionally obsolete bridges in segments 1, 3, 4, 9, 10, and 12. Segments 4 and 12 have the lowest Bridge Index and a high percentage of functionally obsolete bridges.

3.2 Pavement

The Pavement Index and secondary performance measures were calculated for the I-17 corridor using pavement condition data provided by ADOT for the timeframe from 2013 and 2014.

Overall, based on the weighted average of the Pavement Index, the pavement is in “good” condition. There are several failure hot spots along the corridor in segments 3, 7, 8, 9, 11, and 12, including 17 miles on northbound I-17 and 3 miles on southbound I-17.

Segments 11 and 12 are the only two segments on the corridor that have a “fair” pavement rating. Segments 11 and 12 have the lowest Pavement Index, the lowest PSR, and the highest percentage of pavement (more than 20%) in “poor” condition. The northbound pavement is in worse condition than the southbound pavement because trucks are typically loaded when driving northbound and typically unloaded when driving southbound.

Figure 12: I-17 Corridor Performance Index Summary

	17-1	17-2	17-3	17-4	17-5	17-6	17-7	17-8	17-9	17-10	17-11	17-12	Weighted Average
Pavement	4.19	4.16	3.85	4.25	4.25	4.26	3.92	4.32	4.21	4.19	3.73	3.70	4.07
Bridge	6.76	6.79	6.39	5.71	7.25	6.19	6.31	6.04	6.00	6.52	6.91	5.80	6.34
Mobility	0.75	0.57	0.85	0.87	0.86	0.51	0.78	0.53	0.53	0.43	0.36	0.36	0.60
Safety	0.83	0.77	1.20	0.88	0.94	1.37	1.10	0.71	0.48	1.24	0.87	1.80	1.09
Freight	0.94	0.95	0.94	0.67	0.88	0.74	0.75	0.88	0.75	0.74	0.94	0.93	0.85

I-17 Corridor Study: MP 215 to 340
Performance Index Summary

N

MILES
0 5 10 20

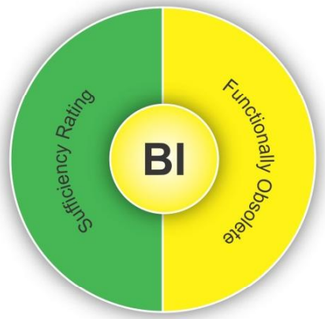
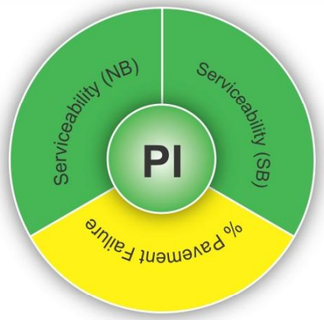
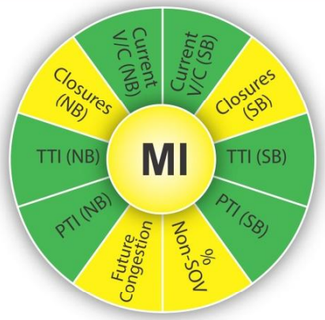
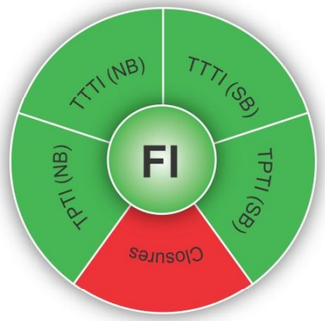
Performance Index Scale

	Pavement	Bridge	Mobility	Safety	Freight
Above Average, Good	> 3.75	> 6.5	< 0.71 (0.56)	> 1.24	> 0.77
Average, Fair	3.2 - 3.75	5.0 - 6.5	0.71 - 0.89 (0.56 - 0.76)	0.76 - 1.24	0.67 - 0.77
Below Average, Poor	< 3.2	< 5.0	> 0.89 (0.76)	< 0.76	< 0.67

Urban (Rural)

Corridor Segment
US Hwy/State Route
County Boundary
City Boundary

Figure 13: Corridor Performance Summary

Bridge	Pavement	Mobility	Safety	Freight
				
Bridge Index (BI) is calculated based on the use of four bridge condition ratings from the ADOT Bridge Database. The four ratings include the Deck Rating, Substructure Rating, Superstructure Rating, and Structural Evaluation Rating.	**Pavement Index (PI)** is calculated based on the use of two pavement condition ratings from the ADOT Pavement Database. The two ratings are the International Roughness Index (IRI) and the Cracking Rating. The calculation of the Pavement Index uses a combination of these two ratings.	**Mobility Index (MI)** is an average of the current volume to capacity (V/C) ratio and the projected 2035 V/C ratio for each segment throughout the corridor.	**Safety Index (SI)** is based on the bi-directional (i.e., both directions combined) frequency and rate of fatal and incapacitating injury crashes, compared to crash occurrences on similar roadways in Arizona.	**Freight Index (FI)** is a reliability performance measure based on the planning time index for truck travel.
■ **Sufficiency Rating** - numeric value which is indicative of bridge sufficiency to remain in service. The factors that contribute to the Sufficiency Rating include structural adequacy and safety, serviceability and functional obsolescence, and essentiality for public use. ■ **Functionally Obsolete** - design of a bridge is no longer functionally adequate for its current use, such as a lack of shoulders or the inability to handle current traffic volumes. Functionally Obsolete does not directly relate to the structural adequacy.	■ **Directional Pavement Serviceability** - calculated as a weighted average (based on number of lanes) and measures the condition of the pavement in each direction of travel. ■ **Pavement Failure** - percentage of pavement area that is rated above the failure thresholds for IRI or Cracking, as established by ADOT Materials Group (IRI > 105 or Cracking > 15)	■ **Peak Congestion** - the existing peak hour V/C ratio in both directions of the corridor. This measure provides an understanding of the directional operating characteristics of the corridor during the existing peak hour. ■ **Future Congestion** - is a measurement of the future 2035 V/C ratio and identifies how the corridor will operate in the future from a mobility and congestion standpoint. ■ **Directional closures** - average number of times a segment of the corridor was closed per mile in a specific direction of travel per year. ■ **Travel Time Index (TTI)** - is the relationship of the average peak period travel time to the free flow travel time. The TTI represents recurring delay that occurs along a corridor. ■ **Directional Planning Time Index (PTI)** - the ratio of total travel time needed for 95 percent on-time arrival to free-flow travel time. ■ **Non-single occupancy vehicle trips** - represent the number of trips that are taken in a corridor by vehicles carrying more than one passenger.	■ **% SHSP Emphasis Area** - percentage of fatal and incapacitating crashes that involve at least one of the five Strategic Highway Safety Plan (SHSP) Emphasis Areas. ■ **% Truck Crashes** - percentage of fatal and incapacitating crashes that involve a truck. ■ **% Motorcycle Crashes** - percentage of fatal and incapacitating crashes that involve a motorcycle.	■ **Directional Truck Planning Time Index (TPTI)** - the ratio of total travel time (for trucks only) needed for 95 percent on-time arrival to free-flow travel time. ■ **Directional Truck Travel Time Index (TTTI)** - is the relationship of the average peak period travel time (for trucks only) to the free flow travel time. The TTI represents recurring delay that occurs along a corridor. ■ **Closures** - average roadway closure duration time.

LEGEND: Good/Better than Average Performance Fair/Average Performance Poor/Worse than Average Performance

3.3 Mobility

The Mobility Index and secondary performance measures were calculated for the I-17 corridor using data provided by ADOT from the HPMS system for the year 2013, the AZTDM for the years 2010 and 2035, HERE data from 2013, and closure data from 2009 to 2013.

Overall, based on the weighted average of the Mobility Index, the traffic operations are in “fair” condition. The existing peak hour traffic operations are generally “good” with only two segments showing “fair” performance. Projected traffic growth is expected to result in “poor” performance in approximately 40 percent of the corridor by 2035. The future traffic operations are anticipated to perform “poor” in five of the twelve segments.

Segments 3, 4, 5, and 7 have the lowest Mobility Index and perform the worst in the Future V/C performance measure. A majority of the segments show either “fair” or “poor” performance in the Closure performance measure. Segments 7, 9, 10, 11, and 12 have the highest number of closures.

The TTI and PTI measures generally show “fair” or “poor” performance in the uphill direction of travel in mountainous areas. Segments 4, 6, 9, and 10 appear to have least reliable travel time as they have the greatest difference between the TTI and PTI.

Every segment shows “poor” performance in at least one performance measure except segments 2 and 8.

The I-17 corridor typically experiences a 15% to 35% growth in traffic volumes on Friday through Sunday when compared to mid-week.

3.4 Safety

The Safety Index and secondary performance measures were calculated for the I-17 corridor using data provided by ADOT for the timeframe from January 2009 to December 2013.

Overall, based on the weighted average of the Safety Index, the corridor rates in “fair” condition. A majority of the segments either perform “fair” or “poor” in the Safety Index. Only segments 6, 10, and 12 perform “good” in the Safety Index. Segments 8 and 9 have the lowest rating the Safety Index.

Segment 8 performs “poor” in the Safety Index, top 5 SHSP emphasis areas, and truck-involved crashes. There are several locations of high crash frequency, including northbound in segments 1, 2, 3, and 11, and southbound in segments 1, 2, 3, 4, 7, 8, 9, 10, and 12.

According to representatives of the ADOT Prescott District, there are high crash locations located within segment 4. Segment 4 does score “fair” or “poor” in two of the performance measures and shows one “hot spot” southbound and two “hot spots” northbound.

According to representatives of the ADOT Flagstaff District, the high crash locations are located near MP 312 (northbound), MP 313 (northbound and southbound), MP 317 (northbound), and MP 331 (northbound and southbound). These locations are within segments 10, 11, and 12 which all show “fair” or “poor” performance in at least one of the performance measures. In addition, mileposts 312, 313, and 317 generally correspond to locations identified as “hot spots”.

3.5 Freight

The Freight Index and secondary performance measures were calculated for the I-17 corridor using HERE data provided by ADOT for 2013 and the closure data provided by ADOT for 2009 to 2013.

Overall, based on the weighted average of the Freight Index, the freight mobility is in “good” condition. A majority of the segments show either “good” or “fair” performance in the Freight Index.

The TTI and PTI measures generally show “fair” or “poor” performance in the uphill direction of travel in mountainous areas. Segment 4 (northbound) has the lowest Freight Index and performs the worst in the TTI and PTI performance measures, indicating the least reliable travel time among all segments.

All of the segments show either “fair” or “poor” performance in the closure performance measure. Segments 7, 9, 10, 11, and 12 have the longest duration of closures.

There are two locations along the corridor that have a vertical clearance restriction that cannot be by-passed by using ramps, Table Mesa TI (southbound) and McGuireville TI (southbound).

4 CORRIDOR VISION AND PERFORMANCE GOALS

Interstate-17 (I-17) from SR 101L to I-40 is and will continue to be a major transportation corridor for commuting, commerce, and tourism. ADOT has designated this section of I-17 as a Key Commerce Corridor and as part of the National Primary Freight Network. The Vision for the I-17 corridor contains the following key points:

- Meet goals and vision of Long-Range Transportation Plan and bqAZ
- Enhance safety
- Maintain and preserve highway infrastructure
- Provide reliable route for recreational and tourist travel to/from Northern Arizona
- Provide efficient commuting route between Metro Phoenix area and Northern Maricopa County and Central Yavapai County
- Provide efficient commuting route between Southern Coconino County and Flagstaff
- Provide reliable route for freight connection between I-10 and I-40
- Provide efficient commuting route between Verde Valley and the surrounding communities of Sedona, Prescott Valley, and Flagstaff

4.1 Performance Goals and Objectives

Statewide goals and performance measures were established by the ADOT Long-Range Transportation Plan (LRTP), 2010-2035. Statewide performance goals that are relevant to the I-17 performance framework areas were identified and corridor goals were then formulated for each of the five performance framework areas that aligned with the overall statewide goals established by the LRTP. Table 6 below shows the I-17 corridor performance goals and how they align with the statewide goals.

Table 6: Corridor Performance Goals

ADOT Statewide Long Range Transportation Plan (LRTP) Goals	Performance Area	Corridor Goals
Improve Mobility and Accessibility	Mobility	• Reduce current and future congestion • Reduce delays from non-recurring events and incidents to enhance travel time reliability
	Freight	• Reduce delays and restrictions to freight movements and improve travel time reliability
Preserve and Maintain the State Transportation System	Bridge	• Reduce the number of structurally deficient bridges
	Pavement	• Maintain acceptable level of pavement ride quality
Enhance Safety and Security	Safety	• Reduce fatal and serious injury crashes

For each of the five performance areas, performance objectives were developed specific to the performance measures, such that they facilitate the corridor goals identified above. Based on information from the ADOT Districts, MPOs, and COGs, the Mobility and Safety Performance Areas were identified as critical performance areas for I-17. As such, the corridor objectives shown in Table 7 reflect an emphasis in these two performance areas.

Table 7: Performance Objectives

Performance Measure	Performance Objective	
	Corridor Average	Segment
Bridge Performance Area		
Bridge Index	Fair or better	Fair or better
Bridge Sufficiency Rating		Fair or better
Functionally Obsolete Bridges		Fair or better
Pavement Performance Area		
Pavement Index	Fair or better	Fair or better
Directional Pavement Serviceability		Fair or better
Percent Failure		Fair or better
Mobility Performance Area (Emphasis Area)		
Mobility Index	Good	Fair or better
Existing Directional Peak Hour V/C		Fair or better
Future V/C		Fair or better
Closures		Fair or better
Directional Travel Time Index		Fair or better
Directional Planning Time Index		Fair or better
Non-SOV Trips		Fair or better
Safety Performance Area (Emphasis Area)		
Safety Index	Good	Fair or better
Percent SHSP Emphasis Area Behaviors for Fatal and Serious Injury Crashes		Fair or better
Percent Fatal and Serious Injury Truck Crashes		Fair or better
Percent Fatal and Serious Injury Motorcycle Crashes		Fair or better
Freight Performance Area		
Freight Index	Fair or better	Fair or better
Directional Truck Travel Time Index		Fair or better
Directional Truck Planning Time Index		Fair or better
Closures		Fair or better